

APPENDIX B. ANNOTATED BIBLIOGRAPHY OF MAJOR WORKS

Written works used to construct the bibliographic database related to the impacts of IT in the home were collected in four ways:

- **Keyword search.** A number of databases were searched using a series of keywords to identify works related to IT in the home. The search process was iterative and was repeated with varying keywords until most results were works appropriate to the topic. The author names that appeared most frequently were then subjected to further searches for additional relevant works. The resulting works were then subjected to a series of computer searches and analyst review to verify relevance. Works of borderline significance were retained.
- **Networking.** Known experts in the field were queried by e-mail and asked to suggest works they considered particularly important to the topic.
- **Ad hoc discovery.** Relevant works were discovered during Web searches, from reviews of bibliographies of other works, and from voluntary submissions.
- **Bibliography research.** Nearly 50 bibliographies contained in relevant works were examined. Those bibliographies either confirmed relevant works already on the list or identified additional works to include.

CRITERIA FOR ANNOTATION

There were two criteria for inclusion as a major work. The primary criterion was the level (or unit) of analysis of the study. Works to be annotated had to focus on family-, home-, or household-level effects of IT; studies focusing on individual effects were also included if the context of the research was generally home computing or personal Internet use. Excluded is research that relates to the impacts of home IT activities on business or society. For example, the substantial literature on the impacts of telecommuting on business productivity, job satisfaction, employee turnover, and so forth was not included.

The philosophical literature on the impact of home IT activities on culture, psychological perceptions of time and space, democratic participation, social cohesion or anomie, etc., was similarly excluded.

The second criterion for annotation was that they had to be either published or available on the Web from a credible source. Only 30 works were identified that met these two key criteria. Each annotation describes: (1) the purpose of the work, (2) the methodology and source of data (if it is an empirical study), and (3) key findings or features of the work.

METHODOLOGY

The annotated works included in the database were identified primarily by database searches and an expert networking process conducted by SRI International. These searches located approximately 180 works related to the implications of IT for the home; these resources were overwhelmingly published articles, books, and conference proceedings. A few self-published Web reports were also identified. There are known limitations to this type of literature search methodology; for example, book chapters in edited volumes are not always indexed, and there are time lags in the indexing processing (works published in one year may not be listed for 12 months). Thus, the original set of 180 works reflects indexing as of December 1998.

The original list was reduced to roughly 100 based on a close reading of their titles and abstracts for relevance to the project. These 100 works were then read carefully and included or excluded depending on whether they met the criteria identified above. In addition, the bibliographies and reference lists of literature deemed relevant to the scope of work were scanned to identify other potentially relevant publications. Several works to be annotated were subsequently identified in this way.

A second source of relevant literature was the *Bibliography of Information Technology: An Annotated Critical Bibliography of English Language Sources Since 1980* (Whitaker et al. 1989, chapter 8, "Household & Community References"). Finally, a few works

were “opportunistic” discoveries: for example, other chapters found in edited volumes or other papers found in conference proceedings.

differentiations in the subjects of the works and are not based on Library of Congress subject heading classifications. A list of keywords used and a brief description of their meaning are presented in table B-1.

KEYWORDS

The annotated works also contain highly simplified keyword designations. These keywords reflect basic dif-

Table B-1. Annotated works on the implications of IT in the home: keyword glossary

Keyword	Description
Adoption.....	Analysis or data related to factors that determine IT adoption in households
Citizenship.....	In-depth analysis or data related to uses of IT for citizenship activities
Computer access.....	Analysis or data related to the availability of a computer in the home
Computer usage.....	Analysis or data related to how the computer is actually used (e.g., for games, education, word processing, etc.)
Demographics.....	Analysis or data related to demographic characteristics of households and individuals with (or without) access to computers and the Internet (e.g., age, sex, ethnicity, income, education level, geographic region of users)
Education.....	In-depth analysis or data specifically related to uses of IT in the home for educational purposes
Empirical.....	Designates works that are actual studies of home IT and that use data derived from research or national surveys
Employment & work.....	In-depth analysis or data specifically related to uses of IT in the home for employment and work purposes
Equity.....	Designates works that focus on equitable access to home IT or the informationally disadvantaged
Family impacts.....	Designates works that specifically address the impacts of IT on the family
Framework.....	Designates works that are theoretical or heuristic in nature and intended to provide an analytical framework for studying the impacts of IT in the home
Health.....	In-depth analysis or data specifically related to uses of IT in the home for health and medical purposes
HomeNet.....	Designates works that use data from the HomeNet study of residential Internet use based at Carnegie Mellon University
Internet access.....	Analysis and data related to home access to the Internet
Internet usage.....	Analysis and data related to how the Internet is used (e.g., who uses the Internet, how frequently, for how long, for what purposes, etc.)
Psychological impacts.....	Analysis or data related to the psychological impacts of home computing and Internet use (e.g., social withdrawal, friendship creation, community involvement, Internet addiction, etc.)
Time allocation.....	Analysis or data related to how households allocate time to various activities (watching television, computing, sports and recreation, sleeping, etc.)

ANNOTATED BIBLIOGRAPHY OF MAJOR WORKS RELATED TO THE IMPLICATIONS OF IT FOR THE HOME

Margaret Bruce, "Home Interactive Telematics: New Technology With a History," *Concerning Home Telematics: Proceedings of the IFIP TC 9 Conference on Social Implications of Home Interactive Telematics*, Felix Van Rijn and Robin Williams, eds. (Amsterdam: Elsevier Science Publishers, 1988), pp. 83–93.

Bruce summarizes the experience of commercial interactive videotext services in Britain (Prestel), France (Teletel), Australia (Viatel), and Germany (Bildschirmtext). These services were, in some ways, a precursor to Internet-type services, and were commercially introduced in the early 1980s. Household adoption rates were far lower than expected, however, and by the late 1980s interactive videotext services were only marginally important information technologies.

Key findings include: (1) In all four countries, very few women used interactive videotext services (less than 10 percent of users were female). (2) Innovators failed to account for cost, affordability, sex, race, and class as important determinants of household IT adoption rates. (3) Interactive videotext subscribers tended to use the service for such activities as games, participation in "lonely hearts clubs," shopping, travel and weather information, news, home banking, and entertainment.

Andre H. Caron, Luc Giroux, and Sylvie Douzou, "Uses and Impacts of Home Computers in Canada: A Process of Reappropriation," *Media Use in the Information Age: Emerging Patterns of Adoption and Consumer Use*, Jerry Salvaggio et al., eds. (Hillsdale, NJ: Lawrence Erlbaum Associates, Inc., 1989), pp. 147–62.

The authors evaluate the dynamics of home computer adoption and use by those who were not computer specialists. They conducted a three-stage analysis of French-Canadian viewers of an educational television program aired in Quebec to inform the general public about home computing. The authors sent a questionnaire to 4,300 viewers of the program in November 1983 (response rate 50 percent), then sent a follow-up questionnaire to a subset of these viewers in November 1985 (response rate almost 50 percent). These second questionnaires were then followed up with 18 in-depth family interviews. The results of these questionnaires and interviews are presented in the chapter.

Households that were recent adopters of home computers in 1983 had three distinctive patterns of usage by 1985: households that had quit using the computer entirely, those that had continued to use it, and those that not only continued to use it but bought a second home computer. Socioeconomic factors were *not* important predictors of these patterns of use. What seemed to differentiate the groups is the degree to which the motivation for the original computer purchase was to assist with work-related tasks and not simply for entertainment purposes or to learn about computer technology. Additionally, in households where there was a second home computer, spouses and children used it at higher levels than in households with only one computer. Due to the study's research design and purpose, findings are more usable for theory building than for generalizations or conclusions about adoption behaviors in computing households.

Thomas Childers, *The Information-Poor in America* (Metuchen, NJ: The Scarecrow Press, 1975).

This text is a pioneering literature review and bibliography on the information needs of disadvantaged groups in American society. While the scope and implications of the review are not focused on home computers or the Internet (since the publication of this work precedes both of these technologies), it is invaluable for its summary of the empirical evidence on *how* different social groups are informationally dis-

advantaged. It also identifies the need to conduct research on how people actually use and retain information in their problem solving and how this affects individual quality of life. Childers differentiates between more than a dozen areas of information needs (e.g., health, the law, employment, and transportation) and identifies nine groups of informationally disadvantaged citizens in American society.

Peter C. Clemente, *State of the Net: The New Frontier* (New York: McGraw-Hill, 1998).

Clemente provides an extensive summary and presentation of data obtained from the semiannual American Internet User Survey conducted by Cyber Dialogue on consumer Internet access and usage. This survey is one of the few nationally generalizable marketing studies done on patterns of American Internet use. The text covers data for the years 1994–97. (The American Internet User Survey is a random digit dial telephone survey with replacement sampling for nonresponse. The target population is Americans age 18 and over. The American Internet User Survey has two design elements. The first is a random digit dial telephone survey in which households are screened on their Internet use. The screening survey is used to estimate the adult Internet user population in the United States. For the screening survey, respondents are selected from a geographically stratified set of random digit frames of phone exchanges. For the April 1997 survey, approximately 59,000 phone calls were made; approximately 13,000 households were interviewed regarding Internet use by all individuals in the household.)

Key findings include the following: (1) Women have notably lower rates of Internet use than men. (2) Nearly one-third of the Internet user population in 1997 was “Gen Xers,” individuals between the ages of 18 and 29. (3) Nine out of 10 people use the Internet for personal reasons, and the World Wide Web is the single most popular Internet application, exceeding even e-mail. (4) The four most popular areas of personal Internet use are (in order): news, hobbies, travel, and entertainment. (5) Internet user households are affluent; just under two-thirds of such households have incomes greater than the national average of roughly \$45,000 per year.

Mary Dee Dickerson and James W. Gentry, “Characteristics of Adopters and Non-Adopters of Home Computers,” *Journal of Consumer Research* 10:225–35.

Dickerson and Gentry profile the type of individual most likely to adopt a home computer. They depart from traditional sociodemographic research on this question by exploring the relationship between the creativity of the consumer and his/her experience with other technical products and PC adoption. The data and analysis are based on a 1981 survey of computer club members and subscribers to *Psychology Today* magazine. The authors sent out just over 2,000 surveys; they received 639 usable questionnaires. Their adopter profiles are largely similar to that known for early adopters of household technologies: adopters were largely middle aged, had high incomes, and were well-educated. The psychographic profiles indicate that PC adopters are also “logical introverts,” and that adopters are significantly different than nonadopters in terms of their experience with a wide variety of technical household products.

William H. Dutton, Everett M. Rogers, and Suk-Ho Jun, “The Diffusion and Impacts of Information Technology in Households,” *Oxford Surveys in Information Technology*, Vol. 4, P. I. Zorkoczy, ed. (UK: Oxford University Press, 1987), pp. 133–93.

This major literature review of existing research on home computing and cable television in households examines: (1) factors related to the adoption of IT, (2) how IT is used in households, and (3) the social implications that extend from these patterns of adoption and use. The meta-research presented here integrates survey research primarily from the United Kingdom and United States. The work provides a helpful conceptual framework for understanding the social impacts of IT in the home and a comprehensive review of works published through 1987.

Oliver Egger and Matthias Rauterberg, "Internet Behaviour and Addiction," <http://www.ifap.bepi.ethz.ch/~egger/ibq/res.htm>.

This student research thesis on whether heavy use of the Internet reflects addictive behavior uses data from an on-line availability survey posted on the World Wide Web. Egger and his thesis advisor, Rauterberg) are affiliated with the Swiss Federal Institute of Technology in Zurich. The questionnaire was posted on the Web in German and English, and electronic announcements about the survey were posted via e-mail, newsgroups, and websites to solicit respondents. The survey was posted for six weeks. A total of 454 valid surveys were obtained; 61 percent of the respondents were from Switzerland, 22 percent were from the United States, and the remainder were from a variety of other countries. The survey contained nearly 50 individual items in five major categories: social uses of the Internet; usage patterns; feelings; experiences; and basic demographics. This study is notable for its relevance, appropriateness of questionnaire items to Internet addiction literature and issues, and thoroughness and clarity of method. Statistical analysis of each questionnaire item is presented.

Because this is a nonprobabilistic study, its findings cannot be generalized to a larger population. However, the findings strongly suggest future research and theory on the relationship between Internet use and addictive behaviors. Key findings include the following: (1) Ten percent of respondents perceived themselves as addicted to, or dependent on, the Internet; and objective measures of addiction were, on the whole, statistically significant for this group. (2) There were no statistically significant demographic differences among people who considered themselves Internet addicts in terms of sex, age, nationality, or living situation.

Joseph B. Giacquinta, JoAnne Bauer, and Jane E. Levin, *Beyond Technology's Promise: An Examination of Children's Educational Computing at Home* (Cambridge, UK: Cambridge University Press, 1993).

This book reports the results of a qualitative study (Studies of Interactive Technology in Education—SITE) of 70 families from 1984–86. The purpose was to analyze how children used computers at home; the focus was not on learning outcomes for children. The families in the SITE study were primarily white, middle and upper class households from the New York City tri-state area. Each family was studied for four months; fieldworkers made 6 to 10 visits of 1 to 3 hours per visit and recorded data in a field log. Log content was analyzed for patterns of computer use.

Key findings include the following: (1) A "near absence" of children's academic computing at home; that is, computing for the purpose of learning school subjects and critical thinking. Game playing consumed most of the children's time on the computer. (2) Children (or families) were discouraged from using or talking about their computers because of negative social pressures at school and by neighbors. (3) Parental support and encouragement was an important factor in children's use of the computer for educational purposes. (4) A substantial number of differences by sex emerged in patterns of use of the computer, attitudes toward computing, and roles in computing decisions.

Penny Gurstein, "Working at Home and Living at Home: Emerging Scenarios," *Journal of Architectural and Planning Research* 8(2):164–80.

Gurstein assesses the impact of home-based computer work on home and work life. The findings and analysis are based primarily on a survey conducted in 1989 of 45 homeworkers and 9 office workers in California who used telecommunications and IT to conduct their work. (No information is available on the sample frame or research methodology.) Although the findings from this research cannot be generalized to a larger population, the author does detect household-level impacts of home-based computer work that are suggestive for further research. First, she finds that there is an important blurring of work and home boundaries— the physical space itself combines work and home characteristics (e.g., a home office in the

living room); homeworkers have a more difficult time separating work and home activities (e.g., they can never get away from their work); and the home loses its role as a refuge from the outside world (e.g., clients visit the home office). Second, as a consequence, homeworkers report chronic conflicts between home and work activities, difficulty in delineating the public and private spaces of the home, role conflicts, the blurring of work and leisure time (with the net result of less leisure time), the tendency to “overwork” relative to office peers, and a sense of isolation from and invisibility to office-based colleagues. The research is valuable for highlighting the potential of homeworking in fundamentally affecting roles of family members and the role of the home itself relative to family members.

Laurence Habib and Tony Cornford, “The Virtual Office and Family Life,” *SIGCPR/SIGMIS '96; Proceedings of the 1996 Annual Meetings of the Association for Computing Machinery Special Interest Group on Computer Personnel Research/Special Interest Group on Management Information Systems* (Denver: Association for Computing Machinery, 1996), pp. 296–304.

Habib and Cornford argue that the impact of telework (telecommuting) arrangements on the family has been a neglected area of study. Traditional research on the impacts of telework focuses on productivity, job satisfaction, job stress, overwork, career paths, and so on. Because telework shifts the locus of work from office to home, the boundary between office and home is blurred; this has consequences for family dynamics. The authors offer a framework for studying the impact of telework on families; four core dimensions (family roles, the physical space and environment of the home, time allocation patterns, and household finances) are analyzed in the context of changing home rules and norms caused by telework.

James C. Hersey, Jennifer Matheson, and Kathleen N. Lohr, *Consumer Health Informatics and Patient Decision-Making*, AHCPR Report No. 98-N001 (Rockville, MD: U.S. Department of Health and Human Services, Agency for Health Care Policy and Research, 1997).

This analysis is an important review of the literature on the effectiveness and impacts of health informatics tools on consumer health. Such tools are designed to give patients information and help their decision-making on treatment choices for disease, illness, or healthcare. Health informatics cover a wide range of media and technologies including brochures, videotapes, interactive video, audiotapes, computer-generated letters, and Internet and other network-based information systems. The authors review and critique research designs for studying the impact of health informatics tools on consumers and make several substantial recommendations. In addition, they note that “a major knowledge gap” exists on the effectiveness of different informatics tools relative to one another (e.g., videotapes versus brochures, etc.). Few studies have been conducted on interactive, network- and computer-based informatics tools, but those that have find statistically significant impacts on such factors as patient knowledgeability, hospitalization rates, satisfaction with medical care, and overall health.

Wolfgang Hesse, Sigrun Goll, Thomas Biedassek, and Julie Remington, “Quality of Life Criteria for Assessing Information Technology in the Home Environment,” *Human Aspects in Computing: Design and Use of Interactive Systems and Information Management. Proceedings of the Fourth International Conference on Human-Computer Interaction, Vol. 2* (Amsterdam: Elsevier Science Publishers, 1991), pp. 1270–75.

This chapter presents an analytical framework that developers of new information technologies can use to assess the impacts of their technologies on the quality of life of the home environment. Although short, the piece is useful because it is the only work that explicitly provides a quality of life approach to understanding the impacts of home-based IT. The authors offer and explain quality of life criteria related to physical, cognitive, emotional, professional, social, and “self-reflection” impacts.

Kevin A. Hill and John E. Hughes, *Cyberpolitics: Citizen Activism in the Age of the Internet* (Lanham, MD: Rowman & Littlefield Publishers, 1998).

Hill and Hughes explore and evaluate several hypotheses about political ideology, the content of political speech on the Internet, and participation in on-line political activism by traditionally disenfranchised groups. Of relevance here is chapter 2, "Internet Activists." The authors use 1995 and 1996 data from the Pew Research Center for the People and the Press to compare Internet activists to both the general public and the general Internet user population. (The Pew surveys are random digit dial telephone surveys with replacement sampling for nonresponse whose target population is all individuals 18 years or older residing in the continental United States.) Internet activists are identified as those individuals who chat about politics and post political messages on-line.

Key findings include the following: (1) Internet activists are predominantly (77 percent) male. (2) The proportion of Internet activists that are nonwhite is comparable to that of the U.S. population—there does not appear to be an "ethnic gap" in Internet activism. (3) Internet activists are much more affluent and better educated than the general U.S. population. (4) Multivariate analysis indicates that Internet activists are more liberal than the general public on issues such as banning books, accepting homosexuality, and opposing the regulation of sexually explicit materials on the Internet (the differences between Internet activists and the general public were statistically significant at the .001 level). (5) Multivariate analysis indicates that Internet activists are also more politically active and knowledgeable than the overall population. (They voted more, read the paper for news more, and listened to news radio more; these differences were statistically significant at the .001 level.)

Starr R. Hiltz and Murray Turoff, *The Network Nation: Human Communication Via Computer*, rev. ed. (Cambridge, MA: The MIT Press, 1993).

This book is an extensive treatment of computer-mediated human communication, particularly through computer conferencing. Of relevance here is chapter 5, "Computer-Mediated Communications and the Disadvantaged," which details the many ways that computer-mediated communication systems can enhance the well-being of the socially disadvantaged, who include the poor and those who are mobility-limited (the elderly, prisoners, people who are physically or mentally handicapped, and people in isolated rural communities).

Donna L. Hoffman, William D. Kalsbeek, and Thomas P. Novak, "Internet and Web Use in the U.S.," *Communications of the ACM* 39(12):36–46.

This article evaluates estimates of the size of the U.S. Internet population generated by four different national surveys: the CommerceNet/Nielsen Internet Demographic Survey, the Cyber Dialogue American Internet User Survey, the Pew Research Center for the People & the Press' Technology in the American Household Survey, and an O'Reilly & Associates market research survey. In addition, the authors provide more precise 1995 estimates of this population based upon their revisions to the CommerceNet/Nielsen Internet Demographic Survey. The article aims to provide more reliable baseline data on the Internet population to consumers, market researchers, investors, and policymakers, among others.

The authors find that the major reason these surveys differ in their estimates on the size of the U.S. Internet population is because of their definition of "Internet use." The value of this article to the present topic is not so much its revised estimates of the Internet user population (which cannot be restricted to users of home-based IT), but its detailed discussion of how to weight and analyze the results of national random digit dial telephone surveys and the sources of bias in these surveys.

James E. Katz and Phillip Aspden, "A Nation of Strangers?," *Communications of the ACM* 40(12):81–86.

Katz and Aspden present the results of a national random telephone survey of 2,500 households in October 1995 that was augmented by another national random telephone sample of 400 Internet users. (No other information is available on the survey methods or designs.) The authors attempt to determine how the Internet affected community involvement and to explore prevailing theories that Internet users become isolated and disconnected from their communities; in addition, they address how the Internet was used to make and form friendships. Respondents were divided into five categories: Internet users (8 percent); former Internet users (5 percent), those aware of the Internet but nonusers (68 percent); and those not aware of the Internet (16 percent).

Overall, the authors found that after controlling for demographic differences between groups (age, sex, education, race, and income), there were no statistically significant differences in the degree to which respondents were members of religious, leisure, or community organizations. In addition, the vast majority of Internet users (both recent and long term) reported no change in the amount of time spent with family and friends on the phone or through face-to-face contact. Regarding friendship creation, 14 percent of the Internet users reported that they "knew people only through the Internet whom they considered their friends," and 60 percent of this group reported that they eventually met their Internet friends face-to-face. Because of the lack of information about the sample frames and methods used for the study, generalizations to larger populations cannot be made. The findings are, however, suggestive for theory and future research.

Robert Kraut, Vicki Lundmark, Michael Patterson, Sara Kiesler, Tridas Mukopadhyay, and William Scherlis, "Internet Paradox: A Social Technology That Reduces Social Involvement and Psychological Well-Being?," *American Psychologist* 53(9):1017–31.

This article reports findings from the HomeNet field trial of residential Internet use, a study based at Carnegie Mellon University. The authors analyze longitudinal data from this study using path-analytic models to determine the relationship between extensive Internet use and social involvement (measured as family communication, size of social networks, and social support) and psychological well-being (measured as loneliness, stress, and depression). In the HomeNet study, families were given home computers and access to the Internet; their usage patterns were then monitored through both passive and active mechanisms (e.g., computer-tracked site visits, questionnaires, and home interviews). The research findings here are based on an availability sample of 169–231 individuals in the Pittsburgh area. Households in the study were recruited from four local high schools and four community development centers; students who worked on the school newspaper and their families were the target population for the high schools, while members of the board of directors were recruited from the community centers. Because this is a nonprobabilistic sample, the research findings cannot be generalized to a larger population, although the findings are suggestive for theory and future research.

In general, the authors found that greater use of the Internet is associated with: (1) "small but statistically significant declines in social involvement" as reflected by family communication and the size of the individual's social network, (2) self-reported loneliness, and (3) increased depression. These correlations held even after controlling for initial states of loneliness, social involvement, Internet use, depression, stress, etc. Although the authors argue that their methods and findings indicate a *causal* relationship between increased Internet usage, declining social involvement, and worsening psychological states, this is an overstatement. The models do not account for intervening factors known to trigger social withdrawal and depression, do not address the possibility that "Internet addiction" could account for the relationships they detect, or allow for the possibility that greater Internet use could be epiphenomenal to social withdrawal or other psychological states.

Robert Kraut, Tridas Mukhopadhyay, Janusz Szczypula, Sara Kiesler, and William Scherlis, "Communication and Information: Alternative Uses of the Internet in Households," *CHI '98; Proceedings of the 1998 Conference on Human Factors in Computing Systems, Association for Computing Machinery Special Interest Group on Computer-Human Interaction* (Los Angeles: Association for Computing Machinery, 1998), pp. 368–75.

This work assesses which is more important to Internet users: interpersonal communication or information acquisition and entertainment? The authors base their analysis on the HomeNet field trial of residential Internet use, a study based at Carnegie Mellon University. In the HomeNet study, families were given home computers and access to the Internet; their usage patterns were then monitored through both passive and active mechanisms (e.g., computer-tracked site visits, questionnaires, and home interviews). The research findings here are based on an availability sample of 110 households (229 individuals) in the Pittsburgh area. Households in the study were recruited from four local high schools and four community development centers; students who worked on the school newspaper and their families were the target population for the high schools, while members of the board of directors were recruited from the community centers. Because this is a nonprobabilistic sample, the research findings cannot be generalized to a larger population, although the findings are suggestive for theory and future research.

Key findings include the following: (1) Internet users strongly preferred interpersonal communication over information acquisition and entertainment in terms of their patterns of Internet and Web use. (2) E-mail was no more popular for some groups than others, particularly those classified as more "sociable"; however, women were heavier e-mail users than men and lighter users of the Web. (3) Internet use patterns among study participants could not be differentiated by income or education.

Robert Kraut, William Scherlis, Tridas Mukhopadhyay, Jane Manning, and Sara Kiesler, "The HomeNet Field Trial of Residential Internet Services," *Communications of the ACM* 39(12):55–63.

This article presents the results of a 1-year snapshot (1995–96) of Internet usage by families in the Carnegie Mellon HomeNet study. In this study, families were given home computers and access to the Internet; their usage patterns were then monitored through both passive and active mechanisms (e.g., computer-tracked site visits, questionnaires, and home interviews). The research findings are based on an availability sample of 48 families in the Pittsburgh area. Because this is a nonprobabilistic sample, the research findings cannot be generalized to a larger population, although the findings are suggestive for theory and future research.

Key findings include the following: (1) People using the Internet search for and access sites that are unique to their individual interests and needs. (2) Use of e-mail drove Internet use for HomeNet participants, largely because teenage family members were the heaviest Internet users and they tended to use e-mail more than any other Internet service. (3) Household income and education did not differentiate patterns of Internet use, but race, sex, and age did. (4) Psychological dispositions, such as innovativeness, depression, and social extroversion did not differentiate patterns of Internet use once demographic factors were controlled for. (5) Males (particularly teenagers) and whites are the heaviest users of the Internet.

Edward F. McQuarrie, "The Impact of a Discontinuous Innovation: Outcomes Experienced by Owners of Home Computers," *Computers in Human Behavior* 5:227–40.

McQuarrie explores computer usage behaviors in terms of the degree of computer usage, satisfaction with computing technology, and attitudes toward computing technology. His purpose is to see if product strength, adopter resources, instrumentality, and social integration act as effective determinants of adoption behaviors. The data and analysis are based on a survey implemented in 1984. The sample frame

was based on several thousand computer owners who had returned a coupon to a market research firm. Two samples of 350 Apple and Radio Shack computer owners were studied for the pilot survey; two samples of 700 Apple, Radio Shack, Commodore, and Texas Instruments owners were used for the main study. The response rates for the pilot study and main study were 52 and 45 percent, respectively. McQuarrie's main findings related to the influence of technical factors in usage patterns. In general, the degree of PC use is mainly associated with high-quality equipment. Social integration also proved to be an important determinant of usage patterns.

National Telecommunications and Information Administration (NTIA), "Falling Through The Net: A Survey of the 'Have Nots' in Rural and Urban America," <http://www.ntia.doc.gov/ntiahome/fallingthru.html>.

This report presents key findings on the degree to which computers and Internet access are becoming a universal service in the United States. Findings are benchmarked to the diffusion of telephones in U.S. households. This is the first of NTIA's reports on national access to home computers and the Internet. The findings are based on the November 1994 Current Population Survey (CPS) conducted by the Bureau of the Census. CPS data are based on interviews with a randomly selected sample of 50,000 U.S. housing units; the response rate is about 94 percent. The present CPS sample covers all 50 states and the District of Columbia.

Key findings of this report include the following: (1) The rural poor have the lowest rates of home computer and modem penetration rates. (2) Minority groups tend to have the lowest levels of computer and modem access but use on-line services for job searches and taking courses more than whites. (3) It is not clear whether income or demographic factors (sex, race, education, age) are the primary determinants of the observed geographic differentiation of household access to computers and modems.

National Telecommunications and Information Administration (NTIA), "Falling Through the Net II: New Data on the Digital Divide," <http://www.ntia.doc.gov/ntiahome/net2/falling.html>.

This is the second of NTIA's reports on national access to home computers and the Internet. The findings are based on the October 1997 Current Population Survey (CPS) conducted by the Bureau of the Census. CPS data are based on interviews with a randomly selected sample of 50,000 U.S. housing units; the response rate is about 94 percent. The present CPS sample covers all 50 states and the District of Columbia.

Key findings of this report include the following: (1) In 1997, 37 percent of U.S. households had personal computers, and 19 percent had home-based access to the Internet. (2) The "digital divide" between some groups of Americans has continued to increase. There is a greater gap in computer ownership between upper and lower income levels, and African Americans and Hispanics lag farther behind whites than in 1994. (3) After accounting for income, there are no significant differences in computer ownership for rural, urban, and central city areas (although rural areas still have substantially lower levels of on-line access). (4) Groups that are least Internet connected are the rural poor, rural and central [inner?] city minorities, households whose head is under age 25, and female-headed households.

National Telecommunications and Information Administration (NTIA), "Falling Through the Net: Defining the Digital Divide," <http://www.ntia.doc.gov/ntiahome/digitaldivide/>.

This is the third of NTIA's reports on national access to telephones, home computers, and the Internet. The findings are based on the December 1998 Current Population Survey (CPS) conducted by the Bureau of the Census. CPS data are based on interviews with a randomly selected sample of 50,000 U.S. housing units; the response rate is about 94 percent. The present CPS sample covers all 50 states and the District of Columbia.

The key finding of this report is that, in spite of rapidly growing rates of home computer and Internet access among all Americans, the digital divide continues to widen. The NTIA reports that “The gaps between white and Hispanic households, and between white and black households, are now more than 6-percentage points larger than they were in 1994. Between 1997 and 1998, the divide between those at the highest and lowest education levels increased 25 percent, and the divide between those at the highest and lowest income levels grew 29 percent.”

Thomas Novak and Donna Hoffman, “Bridging the Digital Divide: The Impact of Race on Computer Access and Internet Use,” <http://www2000.ogsm.vanderbilt.edu/papers/race/science.html>.

This working paper is a longer version of the article “Bridging the Racial Divide on the Internet” published in *Science* (April 17, 1998). The authors analyze the differences between whites and African Americans in terms of their computer access, Internet access, and use of the World Wide Web. In particular, they wish to determine whether apparent racial differences in access and use can be accounted for by income and educational factors. The findings are based on an analysis of data obtained in December 1996–January 1997 through the CommerceNet/Nielsen Internet Demographic Survey. This survey is conducted semiannually through a random digit dial sampling frame of individuals age 16 and over in the United States and Canada. Novak and Hoffman use data only for the 5,813 U.S. respondents; the data are weighted to be statistically representative of the total U.S. population age 16 and over.

Excluding student (high school and college) computer use and behavior, the authors found: (1) After controlling for income, there are no statistically significant differences between whites and African Americans in terms of their ownership of home computers. (2) Regardless of race, educational variables explain access to computers at work. (3) Although income explains racial differences in ownership of home computers, whites are still more likely to own a home computer at all educational levels. With respect to students, there are pronounced racial differences in access to home computers that cannot be accounted for by household income levels.

Organisation for Economic Co-operation and Development (OECD), *Information Technology Outlook 1997* (Paris, 1998).

This text presents a comprehensive overview of the status of IT technology and IT networks in OECD member countries and addresses public policies for the promotion of IT. Of relevance here is chapter 5, “Access to and Use of Information Technologies at Home,” which focuses on the degree of penetration of IT technologies and Internet access in the home in the industrialized nations. Data are from surveys based in the individual member countries.

Key findings of this chapter include the following: (1) Income is the factor that best explains household penetration rates (with an R-square of .77). (2) Family type, particularly the age of the head of the household, is an important predictor of penetration rates due to the presence or absence of children and teens in the household. (3) Penetration rates are much higher in urban areas. (4) The most frequent uses of home computers are (in order) games, educational activities, word processing, recordkeeping, and work-related activities. (5) The presence of a home-based business is an important factor in a household’s decision to purchase a home computer.

John A. Riccobono, *Use of Electronic Information Technologies for Non-School Learning in American Households: Report of Findings From the 1985 Home Information Technology Study (HITS)*, CS-86-215 (Washington, DC: U.S. Department of Education, Center for Statistics, 1986).

This is one of two major reports on the results of the Home Information Technology Study which was designed to provide a national picture of out-of-school (informal) learning activities by Americans and the types of learning resources they used. This report focuses on the availability of IT in the home and IT use for educational purposes. IT is broadly defined and includes print, audio, video, and computer technologies. The target populations were children 2–5 years old, children 6–11 years, children 12–17 years, and adults 18 years and older. HITS was a national random digit dial telephone survey conducted from February through June 1985. A total of 38,566 unique phone numbers were called; 16,591 of these were identified as households and 90 percent were rostered for use in the study. Of those households rostered, approximately 30 percent were sampled for interviews, and response rates varied from 76 to 96 percent for the four target populations. Roughly 4,700 interviews were conducted in all; Margins of error range from +/- 2 percent to +/- 4 percent for the four target populations. Riccobono cautions that inferences to the elderly and low-income populations should be made with caution because of selection bias in random digit dial telephone methods. Otherwise, data were adjusted and weighted to be statistically representative of the U.S. population.

Key findings include the following: (1) In 1985, 13 percent of adults in U.S. households, and approximately 20 percent of children aged 6–17, had access to a computer at home. (2) Income was strongly associated with computer ownership. (3) When computers were available, they were more likely to be used for learning by children than by adults. (4) Computers were almost three times more likely to be used for intellectual rather than recreational learning. (5) There were pronounced differences by sex in every age group, with men being far more likely to use the computer than women. (6) Computer games and programs were perceived as “not helpful” to learning activities by just over half of every age group.

Francine Riley and Donna W. McCloskey, “GTE’s Experience With Telecommuting: Helping People Balance Work and Family,” *SIGCPR/SIGMIS ’96; Proceedings of the 1996 Annual Meetings of the Association for Computing Machinery Special Interest Group on Computer Personnel Research/Special Interest Group on Management Information Systems* (Denver: Association for Computing Machinery), pp. 85–93.

Riley and McCloskey report the results of a 6-month telecommuting pilot study implemented by GTE Corporation in Dallas in 1993. GTE’s goal was to experiment with telecommuting options to improve employee work performance. The company allowed participants in the pilot study to work at home 1 day per week; 120 employees participated, and almost all were management-level workers. The pilot program was evaluated at its 3-month midpoint and at the conclusion of the study through detailed questionnaires administered to the participants, their supervisors, and their customers. Although the bulk of the findings relate to work performance, the authors report that 75 percent of the pilot participants indicated increased feelings of satisfaction with their home life, and 44 percent reported having more quality time with their families.

John P. Robinson, Kevin Barth, and Andrew Kohut, “Social Impact Research: Personal Computers, Mass Media, and Use of Time,” *Social Science Computer Review* 15(1):65–82.

This research aimed to determine whether home computing and Internet use displaces mass media (television, newspapers, magazines, books, radio, and movies). The authors analyze time-use data of computers, mass media, and the Internet obtained by the Pew Center for the People & the Press in national surveys conducted in 1994 and 1995. (These surveys are random digit dial telephone surveys with replacement sampling for nonresponse, whose target population is all individuals 18 years or older residing in the continental United States. The sample for this survey is based on a geographically stratified, random digit dial of working banks of telephone numbers in the continental United States. Results for the 1998 Technology Survey are based on telephone interviews conducted with 3,184 adults in the last quarter of 1998.)

The authors employed standard bivariate correlation analysis and multivariate regression. No statistically significant or systematic patterns of time displacement of the mass media by either personal computing or Internet use were found. This held true for light, moderate, and heavy users of computers and the Internet. The authors found that heavier computer usage is associated with significantly higher amounts of time spent using print media and movies; they conclude that, at this stage of development and diffusion, personal computers are more time enhancing with respect to the mass media than time displacing. They caution that more complete time diary studies must be conducted on home computing before the full time effects of computers are understood.

Charles W. Steinfeld, William H. Dutton, and Peter Kovaric, "A Framework and Agenda for Research on Computing in the Home," *Media Use in the Information Age: Emerging Patterns of Adoption and Consumer Use*, Jerry L. Salvaggio et al., eds. (Hillsdale, NJ: Lawrence Erlbaum Associates, 1989), pp. 61–85.

This chapter provides a framework for studying and analyzing home uses of the computer. The authors provide an extensive review of the literature on home computing and draw on lessons from household experiences with television and insights from computing impacts in organizations. They offer a typology for understanding patterns of PC use (based on frequency and diversity of use) and identify multiple factors that shape personal computing (social status, technical factors, sociocultural setting, and personal attributes). The authors then suggest a research agenda for studying patterns of computing use, which they argue is a prerequisite for theorizing and conducting research on the impacts of home computing. Areas of potential impact for home computing are identified, including education; family functioning; personal development; leisure activities; work from home; household routines; and privacy, civil liberties, and property rights.

Alladi Venkatesh, "Computers and Other Interactive Technologies for the Home," *Communications of the ACM* 39(12):47–54.

This article presents a framework for understanding the everyday activities of the household and potential linkages between those activities and information technologies. The author does not aim to analyze home impacts of IT, but to help home IT designers understand how families interact with IT. The article's relevance to the study of impacts of IT in the home derives from its useful description of the dynamics of a "cyberhousehold" and its reminder that it is not the presence of a technology in a household that matters, but how that technology is used. Theoretical insights into household adoption behaviors of new information technologies are also offered.

Alladi Venkatesh and Nicholas Vitalari, "A Post-Adoption Analysis of Computing in the Home," *Journal of Economic Psychology* 8:161–80.

This article reports how households use new computing technologies once they are introduced into the home. It was based on an availability sample of 282 members of computer clubs in Orange County, California. (The date of the study was not reported, but it was probably conducted in 1984.) Because this was not a probabilistic sample (club members were asked to volunteer for the study), its findings cannot be generalized to a larger population. They are, however, suggestive of future research and theory related to patterns of household adoption of computers.

According to the authors, after exploring several different indicators of computer use, "The results show that utilization patterns vary according to prior knowledge, household structure, and length of ownership."

Nicholas P. Vitalari, Alladi Venkatesh, and Kjell Gronhaug, "Computing in the Home: Shifts in the Time Allocation Patterns of Households," *Communications of the ACM* 28(5):512–22.

This study was an exploratory analysis of the impacts of home computers on the time allocation patterns of households for such activities as watching TV, hobbies, sleeping, studying, sports and outdoor recreation, and leisure time spent with friends and family. It was based on an availability sample of 282 members of computer clubs in Orange County, California. (The date of the study was not reported, but it was probably conducted in 1984.) Because this was not a probabilistic sample (club members were asked to volunteer for the study), its findings cannot be generalized to a larger population. They are, however, suggestive of future research and theory related to the impact of computing on other household activities. Participants were asked to complete a questionnaire related to computer use, user attitudes, levels of satisfaction with the computer, and user demographics.

Key findings include the following: (1) Only 6 percent of the respondents were female. (2) Most respondents (77 percent) had experience with computers before they purchased one for their home. (3) Primary computer use was distributed relatively equally among entertainment, word processing, business use, and hobby use, but few respondents (5 percent) indicated that they used the computer primarily for financial purposes. (4) There were notable decreases in time spent watching TV, working on hobbies, and sleeping; and notable increases in time spent alone and time spent studying and doing homework. (5) Age, income, and the presence of children in the household were the three demographic variables that were most strongly associated with differences between groups in the impact of computers on the household's patterns of time allocation.